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New species of *Alona* from South-East Russia and Mongolia related to *Alona salina* Alonso, 1996 (Cladocera: Anomopoda: Chydoridae)

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Abstract

Two new species of genus *Alona* Baird, 1843 were found in regions along the south-east border of Asian Russia. *Alona irinae* **sp. nov.** was found in a lake in the plain of the Zeya River, a north tributary of the Amur River, and in a lake in the steppe region along the West coast of Baikal. *Alona floessneri* **sp. nov.** inhabits saline lake Uvs-Nuur on the border of Russia and West Mongolia, and several other saline lakes of Mongolia. Both species share numerous affinities with each other and with the Iberian species *Alona salina* Alonso, 1996, but differ in the shape and armament of postabdomen, sculpture of carapace, and size. Detailed morphology of *Alona salina*, including that of juveniles, was studied for the first time. Studied species belong to the *elegans*-group of species, likely of generic rank, which include also *A. elegans* Kurz, 1875 and *A. orellanai* Alonso, 1996.

Key words: Cladocera**,** *Alona elegans* group, morphology, systematics, north-central Asia

Introduction

The cladoceran fauna of south-east Siberia, Mongolia, far-east Russia, and the northern part of East Asia generally, is not yet sufficiently studied (Korovchinsky 1992). A number of endemics were already recorded from eastern and central Asia for some of the better-investigated groups of Cladocera. For example, there are seven endemic species of *Diaphanosoma* in the area (Korovchinsky 2004). The region along the south border of Russia, the border between the Palearctic and Oriental zoogeographic provinces, mostly escaped the attention of cladocerologists. A new species of *Daphnia* was recently described from the area (Kotov *et al.* 2006).

Investigation of samples from a lake in the steppe region along the west coast of Lake Baikal, from the plain of the Zeya River, a northern tributary of the Amur River, from Uvs Nuur, a large endorheic saline lake in northwest Mongolia, and from several other saline lakes in Mongolia revealed populations of genus *Alona,* similar to the Iberian species, *Alona salina* Alonso, 1996. This species was not fully studied, and detailed information about trunk limb morphology and juvenile animals was not provided in the initial description (Alonso 1996). The aim of present research was (1) to investigate detailed morphology of *Alona salina,* (2) to clarify the taxonomic status of Asian populations, and (3) to analyse the position of *A. salina* and related species within the genus *Alona*.

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Material and methods

Animals were selected from samples under a binocular microscope, placed on slides (in a drop of a glycerol-ethanol mixture) and studied under a compound microscope. Several specimens from each sample were dissected for the analysis of appendages. Specimens from several of Asian samples were lyophilised, mounted on the aluminium stub, coated with gold, and examined under a scanning electron microscope (Hitachi S 405-A). All specimens in the studied samples were measured using an eyepiece-micrometer. Drawings were made by means of a camera lucida.

Abbreviations. *In the list of material*: ZMOU — Zoological Museum of Moscow State University. *In illustrations and text*: I–VI — thoracic limbs I–VI; as — accessory seta of limb I; cbs — copulatory brush seta of male limb I; e1–3 — endites 1–3 of limb I; end — endopodites, ep — epipodites, ex — exopodites of limbs; gfp — gnathobase filter plates of limbs; IDL — inner distal lobe of limb I; IP — interpore distance (distance between anterior and posterior major head pores); ms — male seta; ODL — outer distal lobe of limb I; pep — preepipodites of limbs; PP — postpore distance (distance between posterior major head pore and posterior corner of head shield); s — sensillum. Numeration of limb setules is given from epipodite to gnathobase, without any implication of homology.

Results

Our study revealed that Asian populations are significantly different from Iberian *A. salina* and belong to two separate new species. *Alona irinae* **sp. nov**. inhabits the lake Zurbat-Nur close to the West coast of Lake Baikal and lake Khasan in the plain of the Zeya River. *Alona floessneri* **sp. nov**. inhabits Lake Uvs-Nuur and several other saline lakes in Mongolia.

TAXONOMY

Alona irinae sp. nov.

(Figs. 1–4)

Etymology. The species named after Russian cladocerologist Irina Konstantinovna Rivier.

Type locality. Lake Khasan, in the plain of Zeya River, in the Amur Area, Russia, 53º29’22.0”N, 126º56’57.1”E.

Holotype. Parthenogenetic female, 20.07.2006, coll. N. G. Sheveleva, preserved in 80% ethanol, deposited at ZMOU, Ml-77.

Paratypes. 7 parthenogenetic females, 20.07.2006, coll. N. G. Sheveleva, preserved in 80% ethanol, deposited at ZMOU, Ml-78; 3 parthenogenetic females, ephippial female, male from lake Zurbat-Nur, Tazheran steppes, Olkhon District, Irkutsk Area, Russia 52º51’97.2”N, 106º35’42.2”E, coll. N.G. Sheveleva, deposited in the first author’s personal collection in Institute for Ecology and Evolution, Moscow.

Diagnosis.

Female. Of moderate size, length up to 0.54 mm. Body regular oval, of moderate height, height /length ratio about 0.68–0.72, maximum height at the middle of the body. Ventral margin with about 40 setae. Posteroventral corner without denticles, with numerous thin setules. Whole carapace covered by dense, broad longitudinal lines. Head shield with broadly rounded posterior margin, rostrum short and rounded. Three narrowly connected major head pores, central pore located at the middle between other pores. PP about 0.8–0.9 IP. Lateral head pores dot-like, located at 1.0–1.2 IP distance from midline. Labral keel suboval, with rounded apex, without clusters of setules on posterior margin.

Postabdomen of moderate width (length about 2.2–2.4 height), with almost parallel margins and broadly rounded dorso-distal angle. Dorsal margin with distal part about 1.6–2.0 times longer than preanal one, with postanal portion slightly longer than anal portion, postanal portion slightly convex, anal portion slightly concave. Preanal angle moderately defined, postanal angle not defined. 2 or 3 single marginal denticles on distal angle and 8–10 clusters of smaller marginal denticles along preanal and anal margin; 9 or 10 lateral fascicles of setules; 4 or 5 fascicles in postanal portion very wide, with setules longer than marginal denticles, all setules in fascicles equally thin. Postabdominal claw of moderate length, slightly shorter than preanal portion of postabdomen. Basal spine long and thin, about 1/3 of length of claw.

Antennula with 9 terminal aesthetascs, longest of them of about half length of antennula. Antennal formula, setae 0-0-3/1-1-3, spines 1-0-1/0-0-1. Seta arising from basal segment of endopodite as long as endopodite. Spine on basal segment of exopodite shorter than middle segment. Spine from apical segment of exopodite slightly shorter than this segment. Apical spine of endopodite of same length as this segment.

Limb I with very long accessory seta, IDL of limb I with three setae, IDL seta 1 very small, two others armed with short setules distally. Exopodite of limb II with very small seta, scraping spines not differentiated. Exopodite of limb III with 6 setae, seta 3 being longest, seta 4 three times shorter than seta 5. Exopodite IV with 6 setae, setae 4 and 6 about 3/4 length of seta 5. Exopodite V with 4 setae, filter plate I consist of single seta. Epipodites IV and V without projections. Limb VI absent.

Male. Body regular oval, of moderate height, height/length ratio about 0.63–0.65, maximum height at the middle of the body. Postabdomen short, with narrowing anal portion and subrectangular postanal portion. Dorsodistal angle not defined. Sperm duct openings located almost at the end of postabdomen. Clusters of short setules in place of marginal denticles, lateral fascicles of setules same as in female. Postabdominal claw 1.5 times shorter than that of female, basal spine 2 times shorter than in female.

Antennule with 10 terminal and 2 lateral aesthetascs. Male seta arising at 1/4 length from tip, about 1/3 of antennule length. Thoracic limb I with U-shaped copulatory hook, IDL seta 1 absent, setae 2 and 3 subequal in length, male seta thick, curved, as long as seta 3.

Description. Parthenogenetic female. *General:* In lateral view, body regular oval, moderately high in adults (Fig. 1C–D, 2A–B), lower in juveniles (Fig. 1A–B). Maximum height at middle of body in adults, in the second quarter of the body at juveniles. In adults height/length ratio about 0.68–0.72; in juveniles of instar II, about 0.64. Dorsal margin highly arched, with small depression at the border of valves and head shield. Posterodorsal and posteroventral angles broadly rounded. Posterior margin uniformly curved. Posterodorsal angle with about 70 short thin setules of equal size, passing into a row of about 100 setules along the posterior margin (Fig. 1F, 2C), at some distance from the margin on inner side of carapace. Ventral margin almost straight, with about 40 setae, first 8–10 setae long, next 10 setae short, other setae of moderate length. Anteroventral angle rounded. Whole carapace covered by dense, broad longitudinal lines (Fig. 1E, 2A–B).
Head relatively small, triangle-round in lateral view, rostrum short, pointing downward (Fig. 2D). Eye larger than ocellus. Distance from tip of rostrum to ocellus equal or slightly greater than that between ocellus and eye.

Head shield with maximum width behind mandibular articulation, without any prominent sculpture (Fig. 1G). Rostrum short, broadly rounded. Posterior margin of head shield broadly rounded. Three narrowly connected major head pores (Fig. 2E, 3A–B), middle pore slightly smaller than others, located at the middle between others. PP about 0.8–0.9 IP. Lateral head pores located about 1.1–1.2 IP distance from midline, at the level of the middle major head pore.

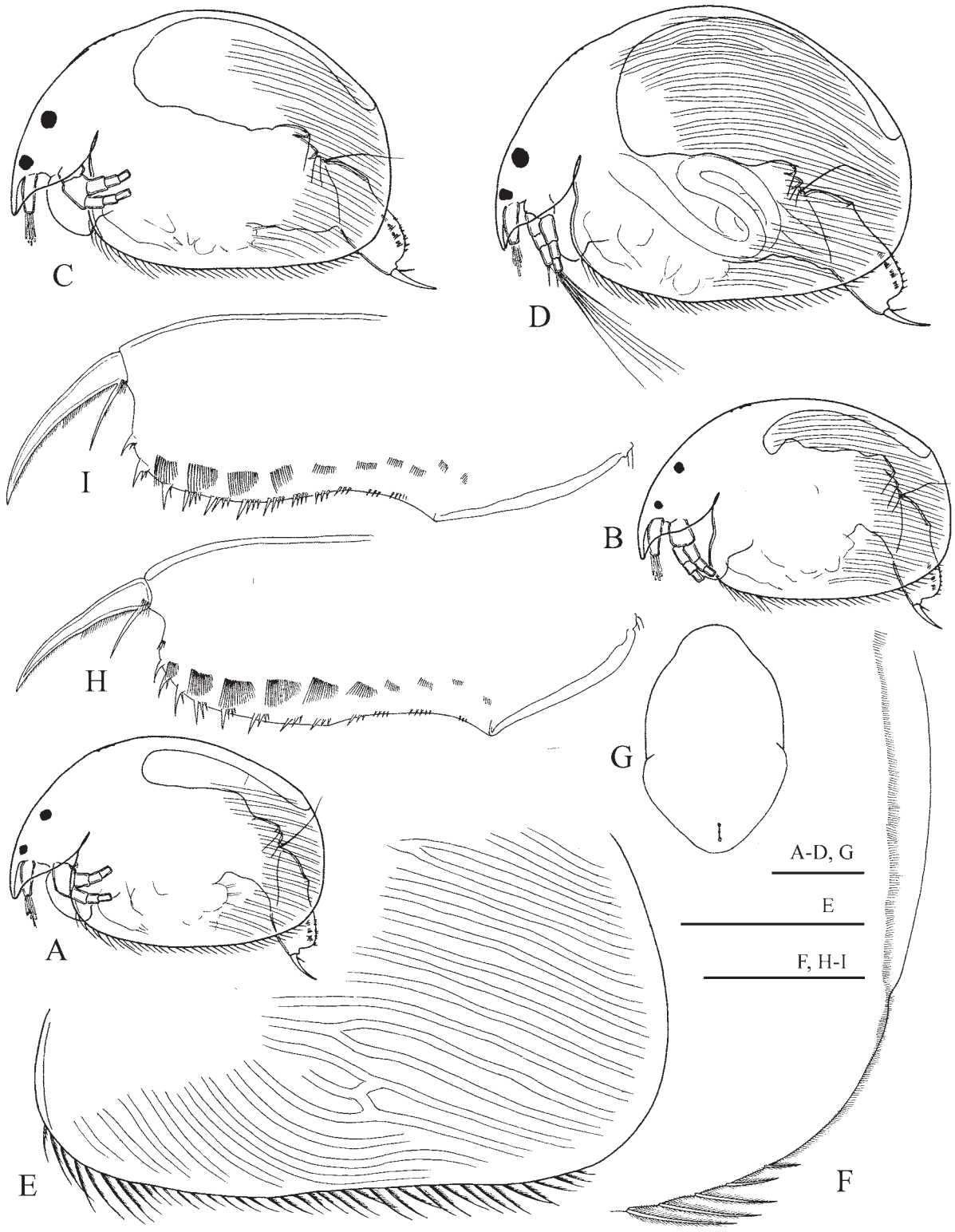

FIGURE 1. *Alona irinae* **sp. nov.**, Khasan lake. A–B—juvenile female of instar II. C–I—parthenogenetic female, C–D—lateral view, E—valve, F—posterioventral angle of valve, G—head shield, H–I—postabdomen. Scale bars: 0.1 mm for A–D, G and E; 0.05 mm for F, H–I.

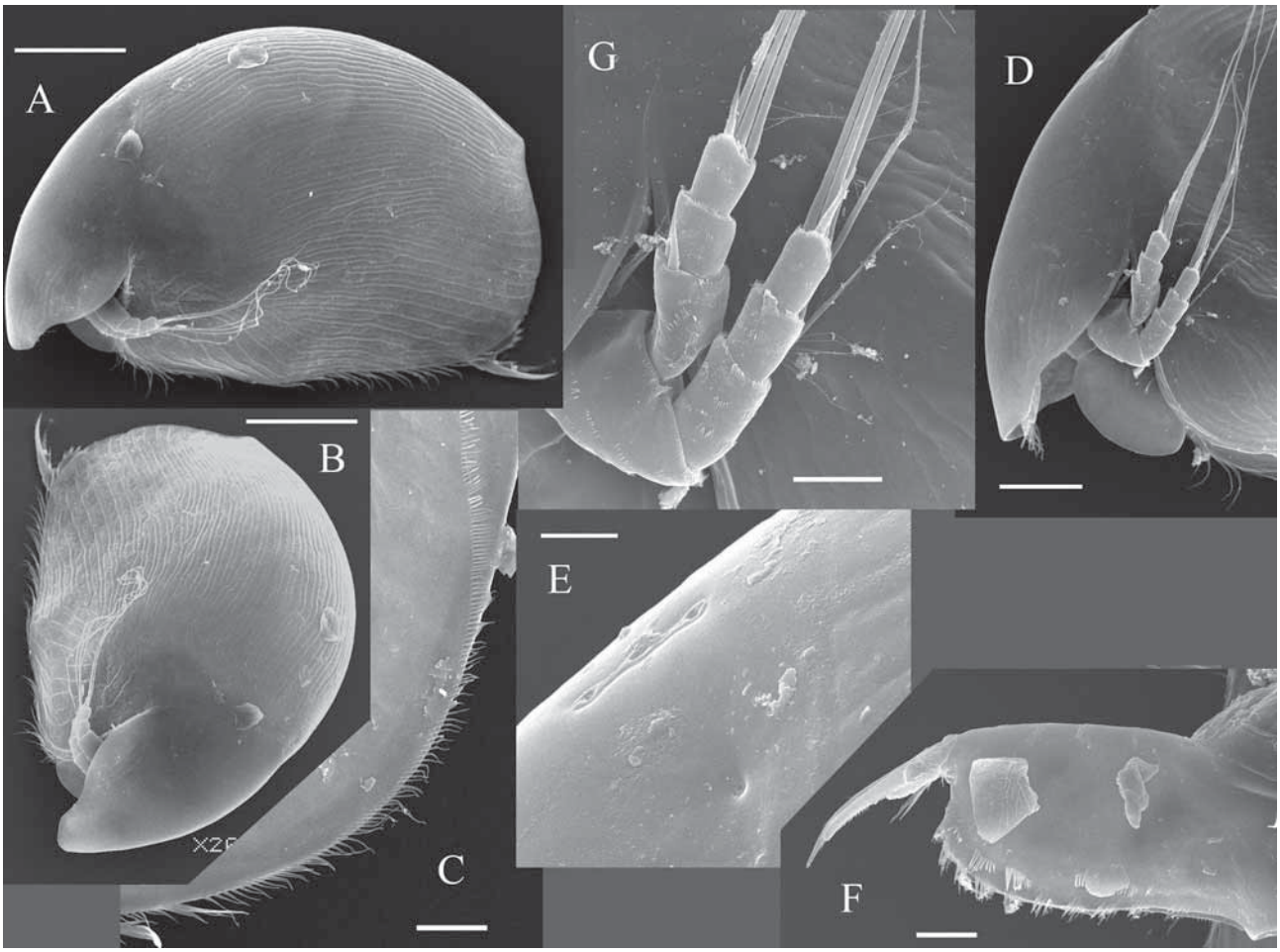

FIGURE 2. *Alona irinae* **sp. nov.**, Khasan lake, parthenogenetic female. A– lateral view. B—front-lateral view. C—posteroventral angle of valve. D—head. E—head pores. F—postabdomen. G—antenna. Scale bar: 0.1 mm for A–B; 0.05 mm for D, F; 0.02 mm for G; 0.01 mm for C, E.

Labrum of moderate size (Fig. 3C–E). Distal labral plate without setulation. Labral keel of moderate width (height/width ratio about 2), with a rounded or blunt apex. Anterior margin of keel convex, posterior margin without clusters of setules.

Thorax and a*bdomen* subequal in length, dorsal surface of abdominal segments not saddle-shaped. No abdominal projections.

Postabdomen (Fig.1H–I, 2F) of moderate width, with almost parallel margins and broadly rounded dorso-distal angle. Length about 2.2–2.4 height. Ventral margin almost straight. Inflated basis of claws bordered from distal margin by clear incision. Distal margin weakly convex. Dorsal margin with distal part about 1.6–2.0 times longer than preanal one, with postanal portion slightly longer than anal portion. Postanal portion of distal weakly convex, anal portion weakly concave. Preanal angle moderately defined, postanal angle not defined. Preanal margin weakly convex.

Postabdomen with two-three single marginal denticles on distal angle and 8–10 clusters of smaller marginal denticles, decreasing in size basally, along preanal and anal margin; 9 or 10 lateral fascicles of setules; 4 or 5 fascicles in postanal portion very wide, with setules longer than marginal denticles, fascicles in anal portion much smaller. All setules in fascicles of similar width. Postabdominal claw of moderate length, slightly shorter than preanal portion of postabdomen. Basal spine long and thin, about 1/3 of length of claw, a cluster of long setules located near its base.

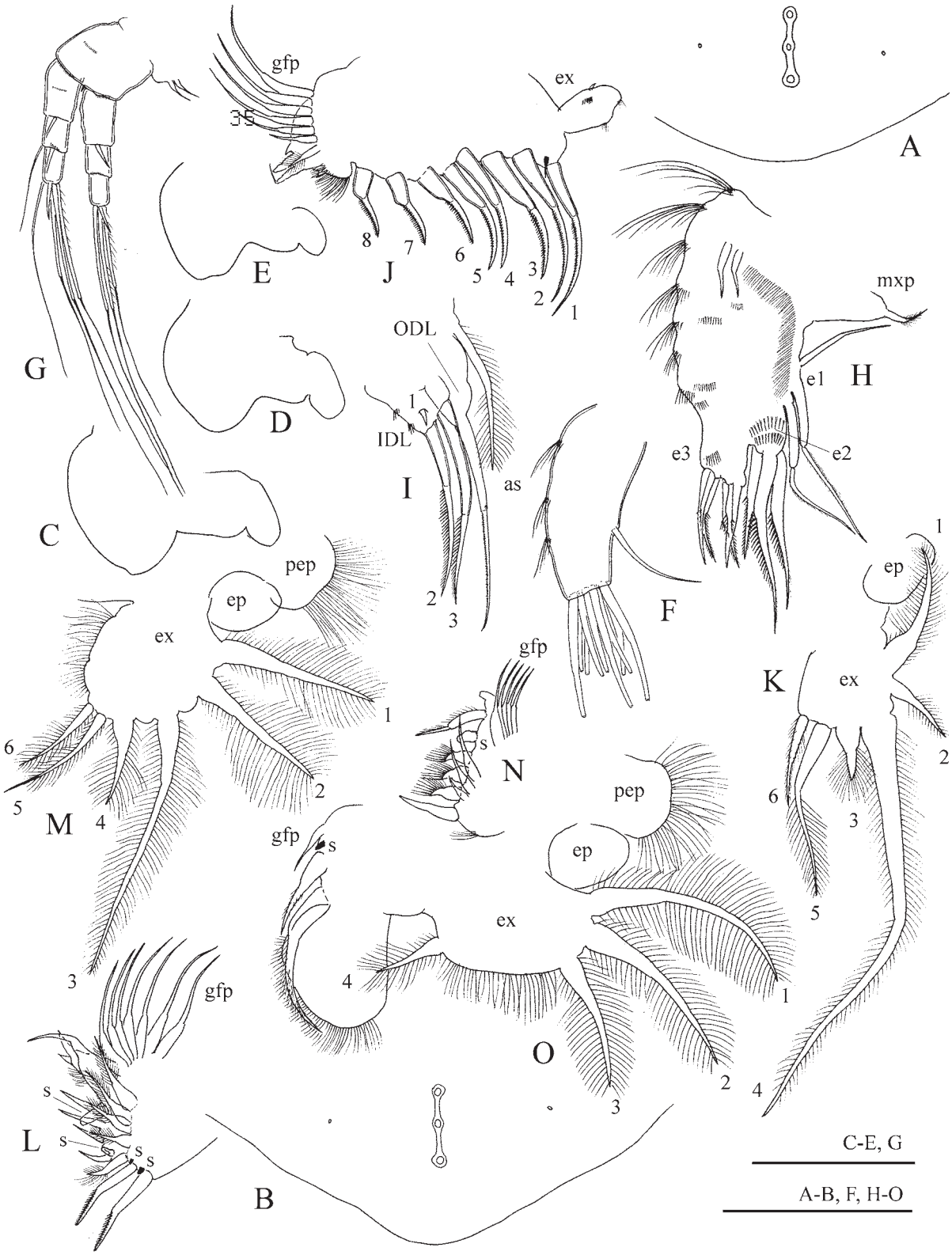

FIGURE 3. *Alona irinae* **sp. nov.**, Khasan lake, parthenogenetic female. A–B—head pores. C–E—labrum. F—antennula. G—antenna. H–I—limb I and its ODL and IDL. J—limb II. K–L—exopodite and inner portion of limb III. M–N—exopodite and inner portion of limb IV. O—limb V. Scale bars: 0.1 mm for C–E, G; 0.05 mm for A–B, F, H–O.

Antennule (Fig. 3F) comparatively large, almost reaching tip of rostrum, with three-four clusters of long setules at anterior face. Length/width ratio about 3. Antennular sensory seta slender, two times shorter than

antennule, arising at 2/3 distance from the base. Nine aesthetascs, three of them 1/3 longer than others, of about half length of antennule, others of similar size. All aesthetascs projecting beyond anterior margin of head shield.

Antenna short (Fig. 2F, 3G). Antennal formula, setae 0-0-3/1-1-3, spines 1-0-1/0-0-1. Basal segment robust, branches short and stout. Basal segments of both branches almost two times longer than middle and apical segments. Seta arising from basal segment of endopodite thin, as long as endopodite itself. Seta arising from middle segment of endopodite of slightly smaller than apical setae. Spine on basal segment of exopodite shorter then middle segment. Spine from apical segment of exopodite little shorter than this segment. Apical spine of endopodite of same length as this segment.

Thoracic limbs: five pairs.

Limb I (Fig. 3H–I) of moderate size. Epipodite oval, without finger-like process. Accessory seta long, about 3/4 of ODL seta. ODL with a long seta with minute setulation. IDL with 3 setae, seta 1 very small. Setae 2 and 3 subequal in length, slightly shorter than ODL seta, both with thin setules in distal part. Endite 3 with 4 setae of same length. Endite 2 with 2 setae, 2 of them long, about length of IDL seta 2, armed with robust setules in distal part, third seta similar to endite 3 setae, but longer. Endite 1 with 2 distally setulated 2-segmented setae and a very long flat seta reaching to the end of maxillar process. No naked setae and sensillae found on endites 1 and 2. Six rows of thin long setules on ventral face of limb. Two ejector hooks of similar size. Maxillar process with single seta.

Limb II: exopodite elongated, with 1 minute seta; 8 scraping spines (Fig. 3J), increasing in length distally, armed with small setules. Distal armature of gnathobase with 4 elements. Filter plate with 7 setae, 2 posteriormost considerably shorter than others.

Limb III: epipodite oval, without process. Exopodite (Fig. 3K) trapezium-shaped, with 6 setae. Seta 3 being longest, setae 5 and 1 of 2/3 and 1/3 length of seta 3, respectively, other setae very short. Distal endite with 3 setae (Fig. 3L), 2 distalmost members slender, sharp, with distal parts unilaterally armed with sharp, strong denticles; basalmost seta two times shorter, bilaterally armed with long setules. Basal endite, with 4 stiff setae, increasing in size in basal direction. Gnathobase not clearly separated from basal endite. Four soft setae increasing in size basally, a small sensillum near the base of distalmost seta. Distal armature of gnathobase with 4 elements. The first one elongated, cylindrical sensillum, second thin, bent seta, others 2 short spines. Filter plate III with 7 setae.

Limb IV: pre-epipodite setulated; epipodite oval, without process. Exopodite irregularly rounded (Fig. 3M), with 6 setae. Seta 3 longest, setae 1 and 2 about 2/3 length of seta 3, seta 5 about half length of seta 3, setae 4 and 6 shorter than seta 5. Setae 5 and 6 slender, plumose like other setae. Inner lobe of limb IV with 4 setae (Fig. 3N). Distalmost seta slender, sharp, armed with small setules, 3 flaming-torch setae subequal in size, armed with similar setules. Sensillum elongated. Three soft setae increasing in size basally. Gnathobase with 2-segmented seta, and pair of small hillocks distally. Filter plate with 5 setae.

Limb V: pre-epipodite setulated, epipodite oval without process (Fig. 3O). Exopodite oval, not divided into 2 lobes, with 4 plumose seta, decreasing in size basally. Inner limb portion a rounded lobe, with setulated inner margin. At inner face, 2 setae, one 3 times longer than another. Filter plate as a single seta, a small sensillum located near it.

Ephippial female (Fig. 4A) similar in shape to parthenogenetic female, ephippium dark brown, with thick longitudinal lines as on the rest of carapace, no polygons present.

Male. Only a single adult male was studied. General shape of adult male (Fig. 4B) similar to that of instar II juvenile female, body height/body length = 0.63–0.65. Ocellus and eye of same size as female.

Postabdomen (Fig. 4C) short, with narrowing anal portion and subrectangular postanal portion. Dorsodistal angle not defined. Preanal angle not defined, postanal angle well-defined. Distal part of postabdomen 1.5 times longer than preanal. Sperm duct openings located ventrally almost at the end of postabdomen. Clusters of short setules in place of marginal denticles, lateral fascicles of setules same as in female. Postabdominal claw 1.5 times shorter than that of female, basal spine about 2 times shorter than in female.

Antennule slightly shorter than in female (Fig. 4D), with 10 terminal and 2 lateral aesthetascs of same length as terminal, but stouter. Male seta arising at 1/4 length from tip, about 1/3 of antennule length.
Thoracic limb I more stout than that of female (Fig.4E), with with U-shaped copulatory hook, copulatory brush present. Several long setules and a row of about 15 shorter setules on ventral face of limb under copulatory brush (Fig. 4F). IDL seta 1 absent, setae 2 and 3 setae subequal in length, much thinner than in female, male seta thick, curved, as long as seta 3.

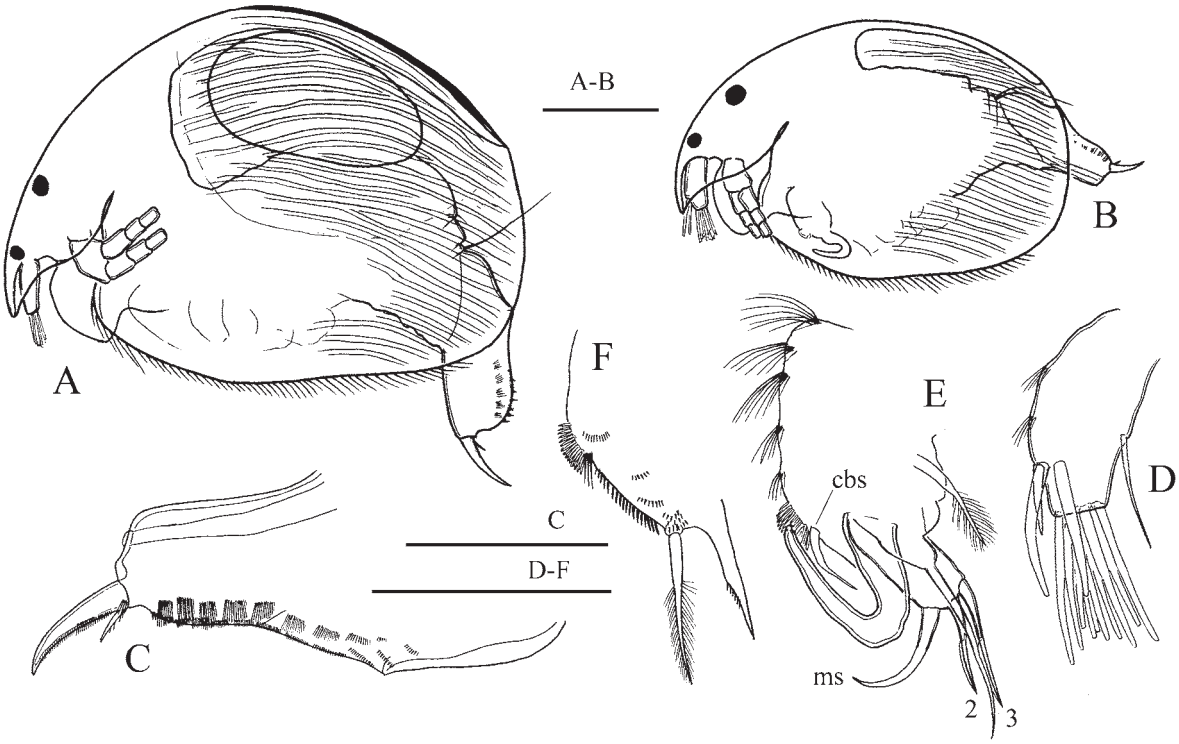

FIGURE 4. *Alona irinae* **sp. nov.**, Zurbat-Nur lake, gamogenetic individuals. A—ephippial female. B–F—adult male: B—lateral view, C—postabdomen, D—antennula, E–F—inner portion and endite 3 of limb I. Scale bars: 0.1 mm for A–B; and 0.05 mm for C–F.

Size. In juvenile females of instar II length 0.40–0.45 mm, height 0.24–0.26 mm., in adult females, length 0.46–0.54 mm, height 0.28–0.33 mm. The only studied adult male has length 0.34 mm, height 0.22 mm.

Remarks. *Alona irinae* **sp. nov.** shares numerous affinities with *A. salina,* which separate it from most other species of the genus. These features include a long seta on basal segment of endopodite of antenna, very small IDL seta 1, very long accessory seta, very small seta of exopodite II, gnathobase filter plate consisting of single seta, etc. It differs from both *A. salina* and *A. floessneri* **sp. nov.** in the sculpture of the carapace, composed of dense broad longitudinal lines, in the rectangular shape of the postabdomen, and in the presence of long, single distal marginal denticles. It also differs from *A. salina* in the morphology of the lateral fascicles of setules of postabdomen, in IDL morphology, in the shape of male postabdomen, and in its smaller size. From *A. floessneri* **sp. nov.,** *A. irinae* **sp. nov.** also differs in its regular oval body, shape and armature of male and female postabdomen, and morphology of exopodite IV. Differences between these three taxa are summarized in Table 1. In the shape of body and sculpture of valves *A. irinae* **sp. nov.** is also similar to *A. elegans* Kurz, 1875 and *A. orellanai* Alonso, 1996. *A. elegans* can be separated from *A. irinae* **sp. nov.** by the shape of postabdomen (postanal portion 1.5 times shorter than anal), by exopodite III with seta 4 as long as seta 5, and the long finger-like processes of exopodites IV–V. *A. orellanai* clearly differs from *A. irinae* in the postabdomen with two rows of lateral fascicles of setules.

TABLE 1. Differences between *Alona irinae* sp. nov., *Alona floessneri* sp. n., and *Alona salina* Alonso, 1996.

Character	*Alona irinae* sp. nov.	*Alona floessneri* sp. nov.	*Alona salina* Alonso, 1996.
Size of adult female	Up to 0.54 mm	Up to 0.56 mm	Up to 0.6 mm
Dorsal margin of valves	highly arched, with depression at posterior part of headshield	moderately arched, without depression at posterior part of headshield	moderately arched, without depression at posterior part of headshield
Posterior margin of valves	convex	almost straight	convex
Sculpture of valves	broad, densely spaced lines	narrow lines	narrow lines
Posterio-ventral angle of valves	with about 70 short, thin setules, not organised into groups	with about 100 long, thin setules, not organised into groups	with about 50 long, thick setules in several groups
Postabdomen, postanal/ preanal parts length ratio	About 1.2	About 1.5	About 1
Lateral fascicles of setules of postabdomen	all setae of same thickness	all setae of same thickness	distalmost seta much thicker than others
Marginal denticles of postabdomen	distal denticles single, as long as setules of distal fascicles	distal denticles in groups, two times shorter than setules of distal fascicles	distal denticles in groups, two times shorter than setules of distal fascicles
IDL setae 2–3	long and narrow	long and narrow	robust, broad
Setae of exopodite IV	setae 4 and 6 about 3/4 length of seta 5	setae 4 and 6 about 2/3 length of seta 5	setae 4 and 6 slightly shorter than seta 5
Male postabdomen	narrowing in anal portion, postanal portion narrow	as *A. irinae*, but with distinct ventro-distal bulge	with parallel margins, postanal portion wide

Distribution and ecology. *Alona irinae* **sp. nov.** is known from two locations — the lake Zurbat-Nur in the steppes along the west coast of Lake Baikal and Lake Khasan in the plain of the Zeya River. The distance between the localities is more than 800 km, so the species is distributed over a significant area. We presume it certainly can be found in other lakes in South Siberia, Mongolia, and the Amur basin.

The Khasan Lake is a small freshwater lake located in the forest, its coastline swampy, and overgrown with vegetation. No specific data about hydrochemistry is available. A rich community of cladocerans was present in the lake during the time of sampling: *Sida crystallina ortiva* Korovchinsky, 1979, *Limnosida frontosa* Sars, 1862, *Diaphanosoma pseudodubium* Korovchinsky, 2000, *Diaphanosoma sp.*, *Ceriodaphnia pulchella* Sars, 1862, *Scapholeberis mucronata* (O. F. Müller, 1776), *Pleuroxus truncatus* (O. F. Müller, 1785), *Graptoleberis testudinaria* (Fisher, 1851), *Eurycercus lamellatus* (O. F. Müller, 1776), *Alona quadrangularis* (O. F. Müller, 1776), *A. affinis* (Leydig 1860), *A. costata* Sars, 1862, *Chydorus* cf. *sphaericus* (O. F. Müller, 1785), *Camptocercus lilljeborgi* Schoedler, 1862, and *Polyphemus pediculus* (Linnaeus, 1761).

Zurbat-Nur lake is located in the steppe area. It is a small (about 0.12 hectare) alkaline lake with salinity 3.1–3.67 g/l, pH 8.2–10 depending on season; maximum depth about 5 m. In the sample from Zurbat-Nur lake *A. irinae* occurred together with *Daphnia magna* Straus, 1820, *Eurycercus lamellatus*, *Oxyurella tenuicaudis* (Sars, 1862), *Alona affinis*, and *Camptocercus rectirostris* Shoedler, 1862. *Chydorus* cf. *sphaericus,* and *Moina sp.* also were recorded from this lake.

***Alona floessneri* sp. nov.**
(Figs. 5–8)

Etymology. The species is named after German cladocerologist Dietrich Flössner.

Type locality. Uvs Nuur (Nuur = lake), Uvs aimag, north-west Mongolia–Russian border, 50º06'55"N, 92º24'25"E.

Holotype. parthenogenetic female, preserved in 80% ethanol, deposited at ZMOU, Ml-79.

Paratypes. 18 parthenogenetic females from type, preserved in 80% ethanol, deposited at ZMOU, Ml-80. 20 parthenogenetic females, 5 gamogenetic females and 8 males from lake Khar Nuur, Hövsgöl aimag, North –central Mongolia. (49º23'38"N, 98º25'19"E), preserved in 80% ethanol, deposited at the first author personal collection in Institute for Ecology and Evolution, Moscow.

Diagnosis.

Female. Of moderate size, length up to 0.56 mm. Body irregular oval, of moderate height, height /length ratio about 0.70–0.74, maximum height in the middle of the body. Whole carapace covered by narrow longitudinal lines. Head shield with broadly rounded posterior margin, rostrum short and rounded. Three narrowly connected major head pores, central pore located at the middle between other pores. PP about 0.8–0.9 IP. Lateral head pores dot-like, located at 1.0–1.2 IP distance from midline. Labral keel suboval, with rounded apex, without clusters of setules on posterior margin.

Postabdomen of moderate width (length about 2.5–2.6 height), with almost parallel margins and broadly rounded dorsodistal angle. Dorsal margin with distal part about 1.9–2.2 times longer than preanal one, with postanal portion 1.4–1.6 times longer than anal. Preanal angle moderately prominent, an incursion in place of postanal angle. Postanal portion of dorsal margin convex, anal portion almost straight. Eight–ten clusters of small marginal denticles along preanal margin, decreasing in size basally, and 3 wide clusters of very short setules on anal margin. About 10 lateral fascicles of setules along dorsal margin; 6 fascicles in postanal portion very wide, with setules 2 time longer than marginal denticles. All setules in fascicles of similar width. Postabdominal claw of moderate length, slightly longer than preanal portion of postabdomen. Basal spine long and thin, about 1/3 of length of claw.

Antennula with 9 terminal aesthetascs, longest of them of about half length of antennula. Antennal formula, setae 0-0-3/1-1-3, spines 1-0-1/0-0-1. Seta arising from basal segment of endopodite as long as endopodite. Spine on basal segment of exopodite shorter than middle segment. Spine from apical segment of exopodite slightly shorter than this segment. Apical spine of endopodite of same length as this segment.

Limb I with very long accessory seta, IDL of limb I with three setae, IDL seta 1 very small, two others armed with short setules distally. Exopodite of limb II with very small seta, scraping spines not differentiated. Exopodite of limb III with six setae, seta 3 being longest, seta 4 three times shorter than seta 5. Exopodite IV with 6 setae, setae 4 and 6 of exopodite IV about 2/3 length of seta 5. Exopodite V with 4 setae, filter plate I consist of single seta. Epipodites IV and V without projections. Limb VI absent.

Male. Body regular oval, of moderate height, height/length ratio about 0.66–0.70, maximum height at the middle of the body. Postabdomen short, with narrowing anal portion, subrectangular postanal portion, and a distinct bulk at ventrodistal portion of postabdomen.. Dorsodistal angle not defined. Sperm duct openings located almost at the end of postabdomen. Clusters of short setules in place of marginal denticles, lateral fascicles of setules same as in female. Postabdominal claw 1.5 times shorter than that of female, basal spine 2 times shorter than in female.

Antennule with 10 terminal and 2 lateral aesthetascs. Male seta arising at 1/4 length from tip, about 1/3 of antennule length. Thoracic limb I with U-shaped copulatory hook, IDL seta 1 absent, setae 2 and 3 subequal in length, male seta thick, curved, as long as seta 3.

Description.

Parthenogenetic female. *General*: In lateral view body irregular oval, moderately high (Fig. 5A–B, 6A–D). Maximum height in the middle of the body. In adults height/length ratio about 0.70–0.74. Dorsal margin arched, without any depression at the border of valves and head shield. Posterodorsal and posteroventral

angles broadly rounded. Posterior margin almost straight. Posterodorsal angle with about 100 setules of equal size, reaching almost to the middle of the posterior margin of valves. A row of about 110 smaller setules along the posterior margin (Fig. 5D, 6E) at some distance from it on inner side of carapace. Ventral setae as in previous species (Fig. 5C). Anteroventral angle rounded. Whole carapace covered by narrow longitudinal lines (Fig. 6A–D). Head as in previous species.

Head shield with gently poligonal sculpture (Fig. 6A–C)). Head pores (Fig. 6F, 7A–B) and labrum (Fig. 7C–E) as in previous species.

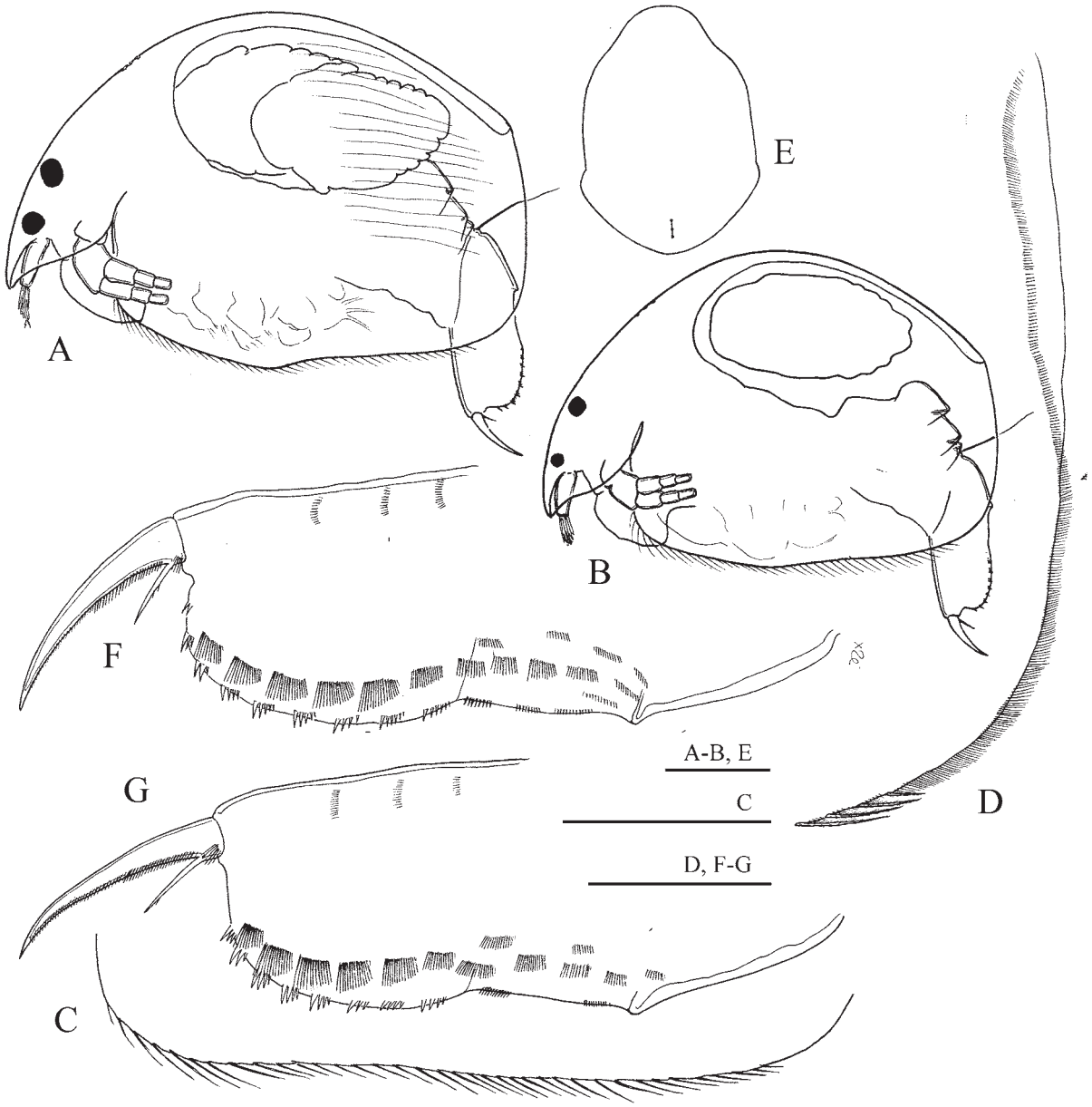

FIGURE 5. *Alona floessneri* **sp. nov**., Uvs Nuur lake, parthenogenetic female: A–B—lateral view. C—ventral margin of valve. D—posterio-ventral angle of valve. E—head shield. F–G—postabdomen. Scale bars: 0.1 mm for A-B, E and C, 0.05 mm for D, F-G.

Postabdomen (Fig. 5F–G, 6G–H) of moderate width, weakly narrowing in postanal portion, with broadly rounded dorso-distal angle. Length about 2.5–2.6 height. Ventral margin almost straight. Incursion between basis of claws and distal margin unclear. Distal margin weakly convex. Dorsal margin with distal part about

1.9–2.2 times longer than preanal one, with postanal portion 1.4–1.6 times longer than anal. Preanal angle well defined, postanal angle as clear incursion. Postanal portion of dorsal margin convex, anal portion almost straight. Preanal margin almost straight. Eight-ten clusters of small marginal denticles along preanal margin, decreasing in size basally, and 3 wide clusters of very short setules on anal margin. A row of about 10 lateral fascicles of setules along dorsal margin; 6 fascicles in postanal portion very wide, with setules 2 times longer than marginal denticles, fascicles in anal portion 2 times shorter, of similar width. All setules in fascicles of similar width. Additional fascicles of setules located above the main row in anal portion. Postabdominal claw of moderate length, slightly shorter than preanal portion of postabdomen. Basal spine long and thin, about 1/3 of length of claw.

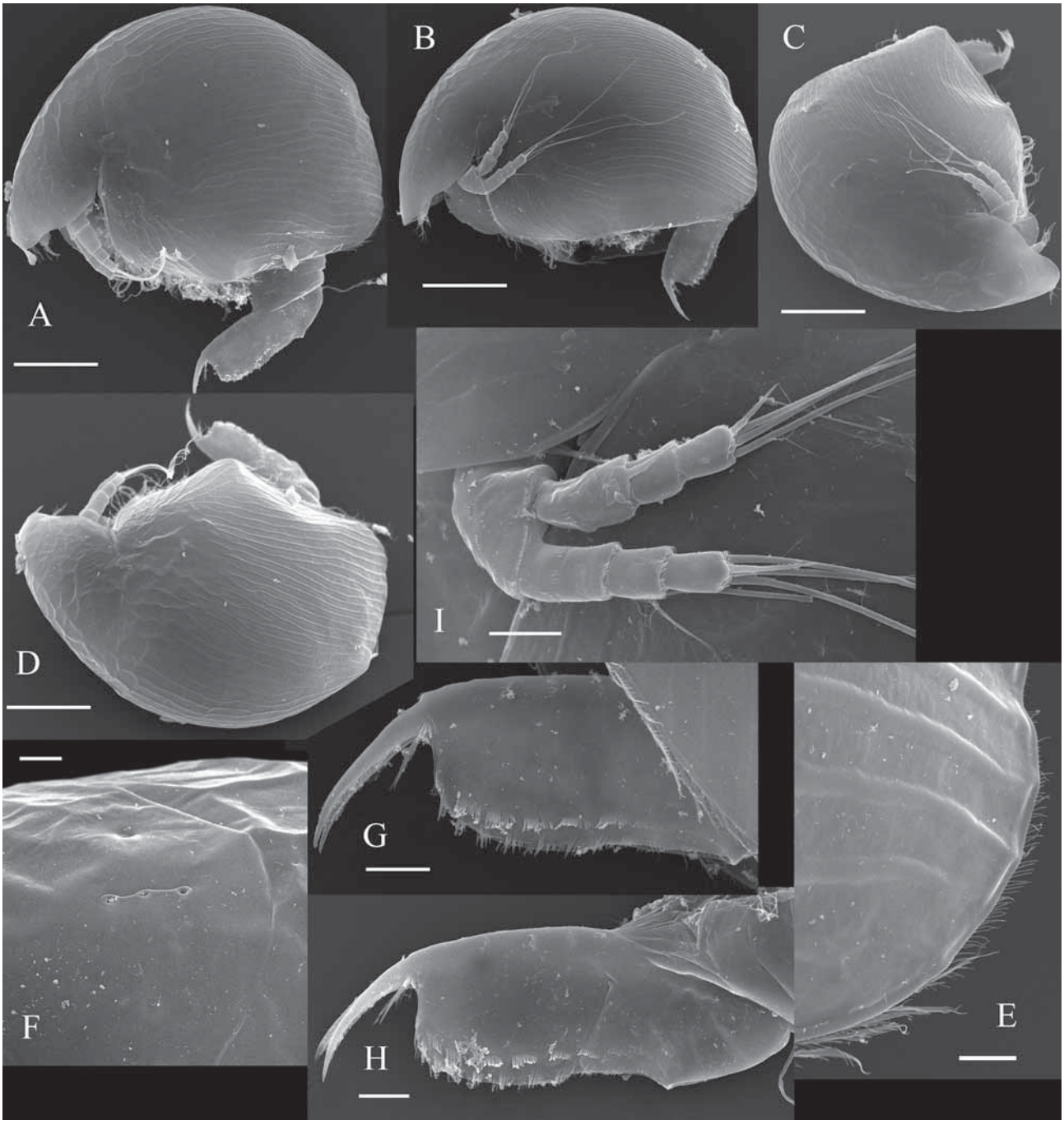

FIGURE 6. *Alona floessneri* **sp. nov.**, Uvs Nuur lake, parthenogenetic female: A–B—lateral view. C–D—anteroventral and dorsoventral view. E—posteroventral angle of valve. F—head pores. G–H—postabdomen. I—antenna. Scale bars: 0.1 mm for A–D; 0.02 mm for G–I; 0.01 mm for E–F.

Antennule similar to that of the previous species (Fig. 7F), but broader, height/width ratio about 2.5. Antenna as in the previous species (Fig. 6I, 7G).

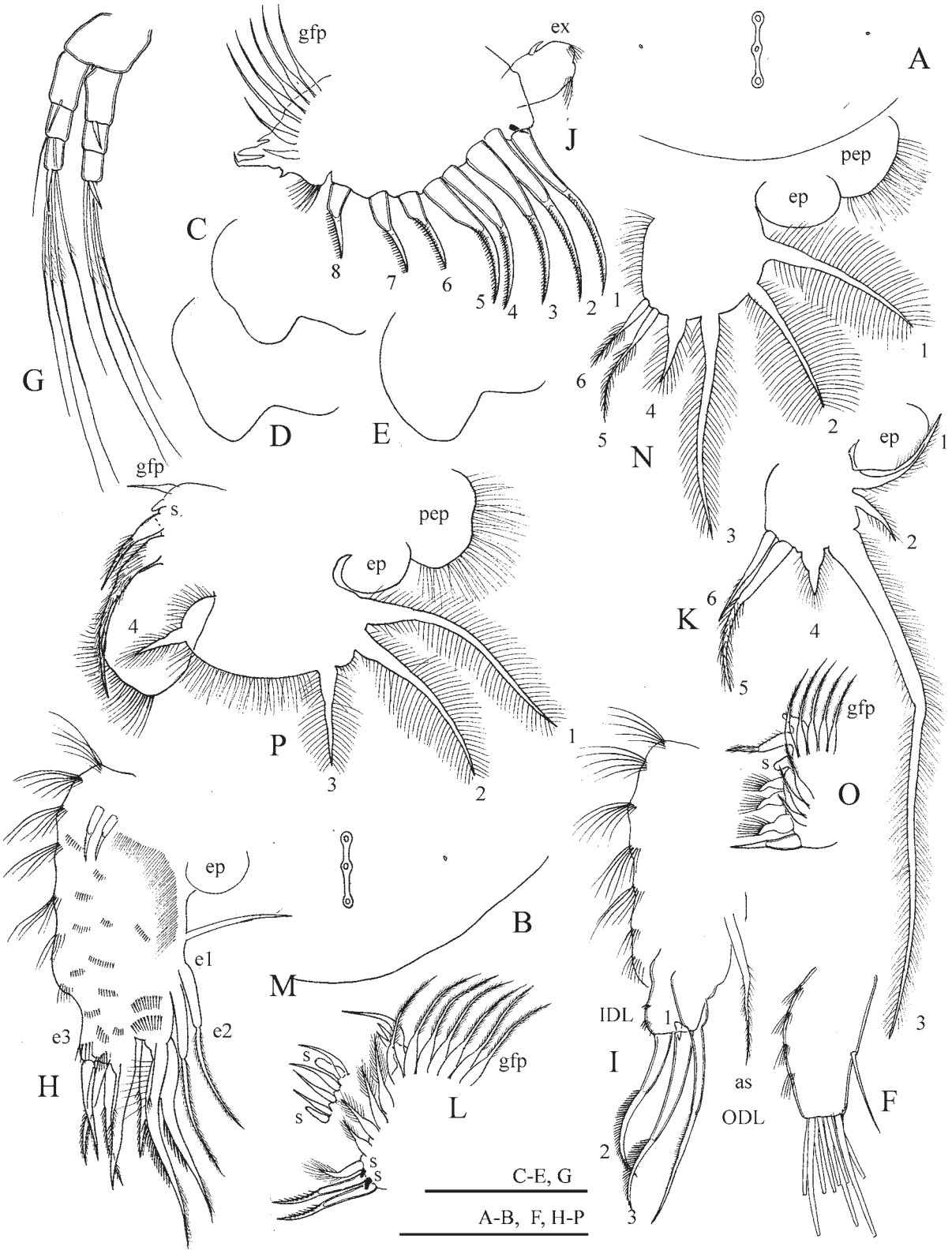

FIGURE 7. *Alona floessneri* **sp. nov**., Uvs Nuur lake, parthenogenetic female: A–B—head pores. C–E—labrum. F—antennula. G—antenna. H–I—limb I and its ODL and IDL. J—limb II. K–M—exopodite and inner portion of limb III. N–O—exopodite and inner portion of limb IV. P—limb V. Scale bars: 0.1 mm for C–E, G; 0.05 mm for A–B, F, H–P.

Thoracic limbs: five pairs. Limb I as in previous species (Fig. 7H–I), but setae of endite III clearly differentiated in size. Limb II as in previous species (Fig. 7J). Limb III as in previous species (Fig. 7K–M), but seta 5 of exopodite armed with small, thin setules. Limb IV as in previous species (Fig. 7N–O), but setae 6 and 4 of exopodite considerable shorter in comparison with seta 5. Limb V as in previous species (Fig. 7P).

Ephippial female (Fig.8A) similar in shape to parthenogenetic female, body height/body length: 0.66–0.70. Carapace in contact with ventral border of ephippium with polygons in place of longitudinal striae. Ephippium dark brown. Ocellus of same size as eye or slightly larger.

Male. General shape of adult male (Fig. 8B) regularly oval, with convex posterior margin, body height/body length = 0.66–0.70. Ocellus and eye of same size as in parthenogenetic female.

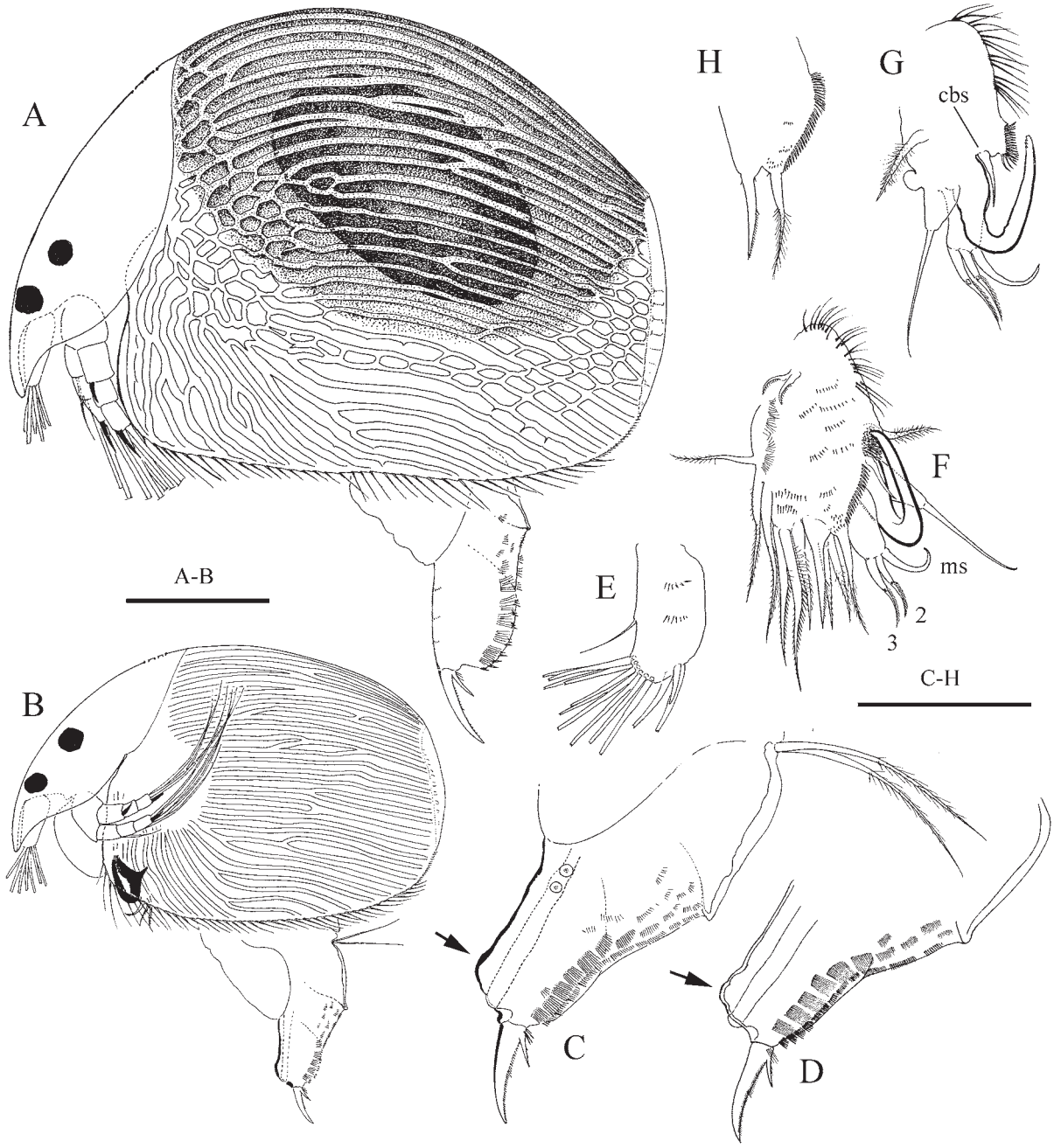

FIGURE 8. *Alona flossneri* **sp.nov.**, Khar Nuur lake, gamogenetic individuals. A—ephippial female. B–H—adult male: B—lateral view, C–D—postabdomen, E—antennula, F–H—general view, inner portion and endite 3 of limb I. Scale bars: 0.1 mm for A–B; 0.05 mm for C–H.

Postabdomen (Fig. 8C–D) short, with narrowing anal portion. Postanal portion subrectangular with distinct ventrodistal bulge. Dorso-distal angle not defined. Preanal and postanal angles well defined. Distal part of postabdomen 1.1 times longer than preanal. Sperm ducts opening ventrally at the end of postabdomen, very close to base of claws.

Clusters of short setules in place of marginal denticles, lateral fascicles of setules same as in female. Postabdominal claw 1.8 times shorter than that of ephippial female, basal spine 3 times shorter than claw.

Antennule (Fig. 8E) and *thoracic limb I* (Figs 8F–H) as in previous species.

Size: adult females, length 0.43–0.55 mm, height 0.30–0.35 mm. Ephippial females, length 0.45–0.57 mm, height 0.30–0.38 mm. Males, length 0.34–0.37 mm, height 0.24–0.25 mm.

Remarks. *Alona floessneri* **sp. n.** differs from *A. irinae* **sp. n.** in body shape, with almost straight posterior margin, in sculpture of the carapace, composed of narrow longitudinal lines, in peculiar shape of the male and female postabdomen, in presence of short groups of distal marginal denticles of female postabdomen, and in shorter setae 4 and 6 of exopodite IV. *Alona floessneri* **sp. n.** differs from *A. salina* in the morphology of the lateral fascicles of setules of postabdomen, in IDL morphology, in the shape of male postabdomen, and in its smaller size. Differences between these species are summarized in Table 1.

Distribution and ecology. *A. floessneri* **sp. nov.** has a wide distribution in saline and subsaline water bodies in Mongolia, which supports the idea that it can appear in similar environments in other Asian countries.

In Mongolia this species is known from Uvs Nuur (85), Kholboo Nuur (109: 45º15’11.9”N, 114º06’45.5”E), Sumiin Bulagriin Nuur (139: 49º08’39”N, 114º52’28.6”E), Khar Nuur (215) and Zuun Khooloi Nuur (309: 47º17’52.3”N, 92º43’53.0”E). In brackets reference numbers and coordinates of the sampling sites in the website **http://www.geodata.es/mongolian_lakes** where further information and pictures of the water bodies can be seen.

Uvs Nuur is a large (361459 hectares) permanent mesotrophic alkaline salt lake with salinity about 13 g/l, $Na/Mg/Cl/SO_4$ type, pH about 9.0 (Flössner et al., 2005), and water electrical conductivity of 29400 μS/cm. Macrophytes are scarce. We presume that the species was already reported from this lake by Flössner *et al*. (2005) as *Alona elegans,* together with other two halobiont crustaceans, the cladoceran *Moina salina* Daday, 1888, and the calanoid *Arctodiaptomus salinus* (Daday, 1885). The presence of *Alona elegans* sensu stricto in the lake is quite improbable, since it is a freshwater species, never reported from saline water (Alonso 1996; Flössner 2000).

Zuun Khooloi Nuur is a shallow, permanent, 773 hectare playa lake. Water is mesotrophic and highly mineralised (10300 μS/cm) and alkaline (pH 9.1). Accompanying halobiont crustacean species were the cladoceran *Moina salina* and the calanoid *Metadiaptomus asiaticus* (Ul’yanin 1875), together with the halo-tolerant *Daphnia magna* Straus, 1820.

Kholboo Nuur (149 hectares and 8120 μS/cm), Sumiin Bulagriin Nuur (1,700 hectares and 7200 μS/cm), and Khar nuur (7 hectares and 13300 μS/cm) are shallow permanent or semi permanent lakes. As in the previous ones, water is highly mineralised but also very turbid because of suspended clay particles. The crustacean community in these lakes is as well characterized by halobiont and halo-tolerant species, namely the calanoid *Arctodiaptomus rectispinosus* Kikuchi, 1940, *Daphnia magna* and *Moina brachiata* (Jurine, 1820) in Kholboo; *M. brachiata* in S. Bulagriin; *Daphnia triquetra* G.O.Sars, 1903, *M. brachiata* and the calanoid *Metadiaptomus asiaticus* in Khar.

***Alona salina* Alonso, 1996**
(Figs. 9–11)

Alona sp. — Alonso, 1990: 224–225, fig. 2a–b.
Alona salina Alonso, 1996: 335–337, fig. 150.

Material examined. Parthenogenetic and ephippial females, adult and juvenile males (over 250 specimens in total) from Laguna de la Dehesilla, 39º25'19.08", N, 2º50'26.47"E, neighborhood of Mota Del Cuervo, Castilla La Mancha, Spain, 01.05.1999.

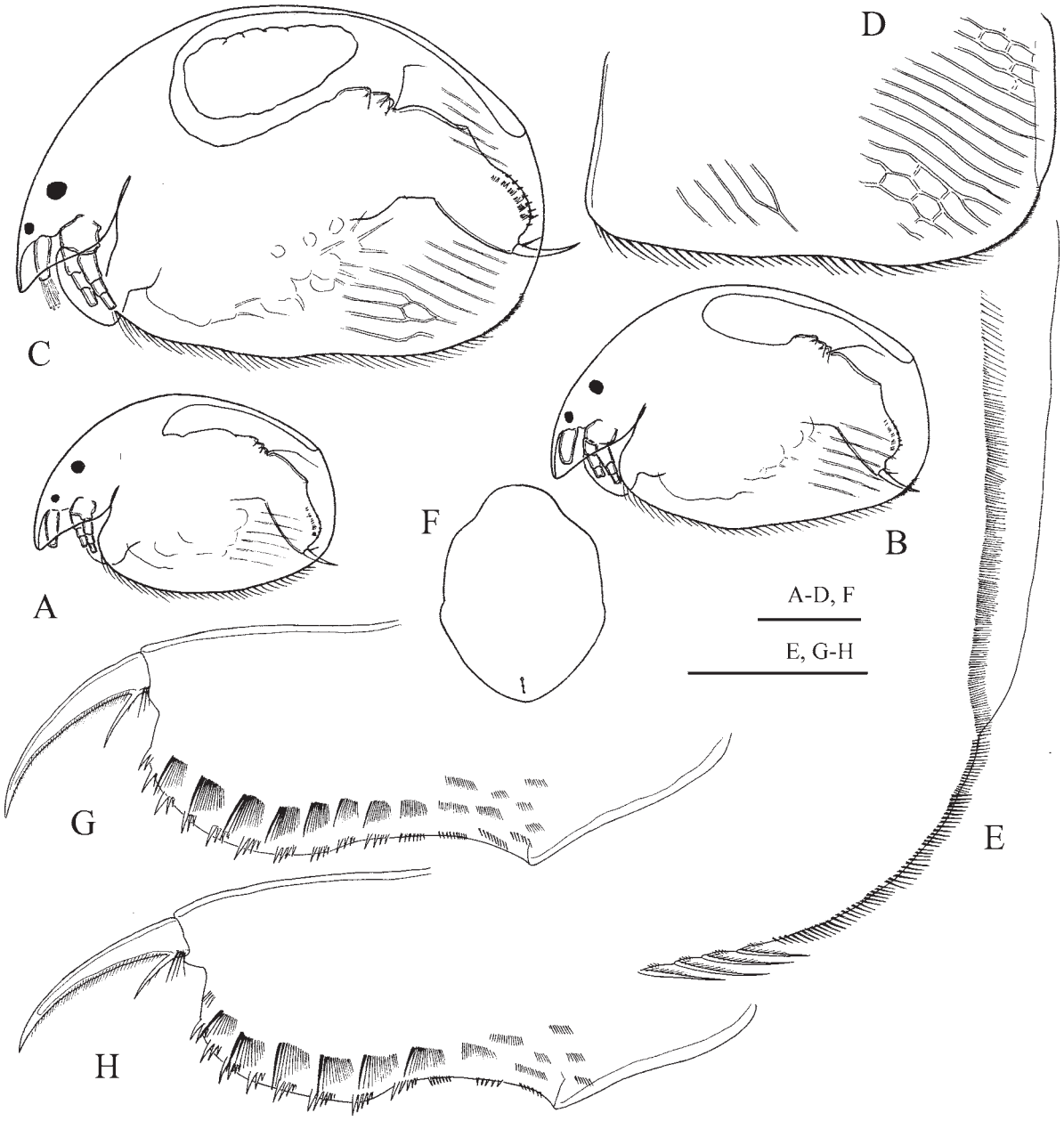

FIGURE 9. *Alona salina* Alonso, 1996, Laguna de la Dehesilla, A–B—juvenile females of instar I and II. C–H—parthenogenetic female: C—lateral viev, D—valve, E—posteroventral angle of valve, F—head shield, G–H—postabdomen. Scale bars: 0.1 mm for A–D, F; 0.05 mm for E, G–H.

Description. *Parthenogenetic female*. General: In lateral view body regular oval, moderately high in adult (Fig. 9C), lower, irregular oval in juveniles (Fig. 9A–B). Maximum height in adult at the middle of the body; in juveniles, in the second quarter of the body. In juveniles of both instars height /length ratio about 0.60; in adults 0.64–0.68. Dorsally arched, without any depression at the border of valves and head shield. Posterodorsal and posteroventral angles broadly rounded. Posterior margin convex. Posterodorsal angle with about 50 setules of similar size, much thicker than in two previous taxa, separated into several groups. A row

of about 100 smaller setules along the posterior margin (Fig. 9E), at some distance from it on inner side of carapace. Ventral setae as in two previous species. Anteroventral angle rounded. Carapace covered by narrow longitudinal lines and hexagons, clearly visible under optic microscope (Fig. 9D).

Head relatively small, triangle-round in lateral view, rostrum short, pointing downward. Eye larger than ocellus. Distance from tip of rostrum to ocellus equal or slightly greater than that between ocellus and eye.

Head shield with gently polygonal structures (Fig. 9A–F). Three narrowly connected major head pores, connection between them more narrow than in two previous species (Fig. 10A–B). Middle pore slightly smaller than others, located at the middle between others. PP about 0.6–0.8 IP. Lateral head pores slightly elongated, located about 1.1–1.2 IP distance from midline, at the level between the middle and anterior major head pores. Labrum (Fig. 10C–E) as in two previous species.

Postabdomen (Fig. 9G–H) wider than in two previous species, weakly narrowing in postanal portion, with broadly rounded dorsodistal angle. Length about 2.3–2.5 height. Ventral margin almost straight. Inflated basis of claws bordered from distal margin by clear incision. Distal margin almost straight. Dorsal margin with distal part about 1.8–2.0 times longer than preanal one, with postanal and anal portion subequal in length. Postanal portion of distal margin weakly convex, anal portion concave. Preanal angle moderately defined, postanal angle not defined or weakly defined. Preanal margin almost straight.

Postabdomen with 8–10 clusters of small marginal denticles and setules, decreasing in size basally, along preanal and anal margin; 8–10 lateral fascicles of setules; 6 or 7 fascicles in postanal portion wide, with setules two times longer than marginal denticles, fascicles in anal portion much smaller. First setules in postanal fascicles more thick than others. Postabdominal claw of moderate length, slightly shorter than preanal portion of postabdomen. Basal spine thin, about 1/4 of length of claw, a cluster of long setules located near its base.

Antennule (Fig. 10F) same as in *A. floessneri* **sp. nov**. Antenna (Fig. 10G) same as in two previous species.

Thoracic limbs: five pairs. Limb I as in two previous species (Fig. 10H–I), but IDL setae 2 and 3 more strong and robust. Setae of endite III slightly differentiated in size. Limb II as in two previous species (Fig. 10J). Limb III as in two previous species (Fig. 10K–L), but seta 5 of exopodite armed with long, thick setules. Limb IV as in two previous species (Fig. 10M–N), but setae 6 and 4 of exopodite almost as long as seta 5. A small sensillum on inner portion of the limb between bases of two basalmost flaming-torch setae, this structure was not observed in two previous species. Limb V as in two previous species (Fig. 10O).

Ephippial female (Fig. 11A) with higher body than parthenogenetic female, ephippium dark yellow-brown, with prominenet sculpture in shape of longitudinal lines thicker than on the rest of valves, in some specimens irregular polygons are present in lower portion of ephippium.

Male. General shape of juvenile males of instar I (Fig. 11B) and II (Fig. 11E) similar to that of juvenile females of same instar. General shape of adult male (Fig. 11I) similar to that of instar II juvenile female, body height/body length = 0.63–0.65. Ocellus and eye of same size as in female.

Postabdomen. In juvenile males of instar I similar to that of juvenile female (Fig. 11C), with sperm duct openings located before the middle of ventral margin. In juvenile males of instar II, shorter than that of female (Fig. 11F), with clear step on ventral margin in region of gonopores. Armament of postabdomen and postabdominal claw same as in female in both juvenile instars. In adult male, postabdomen short, with almost parallel margins in distal portion, dorso-distal angle broadly rounded (Fig. 11J). Preanal angle not defined, postanal angle well-defined. Distal part of postabdomens 1.3 times longer than preanal. Sperm duct openings located almost at the end of postabdomen. Clusters of short setules in place of marginal denticles, lateral fascicles of setules same as in female. Postabdominal claw 1.5 times shorter than that of female, basal spine of same size as in female.

Antennule. In instar I male same as in female. In instar II male antenule broader than in female, with anlage of male seta, aestetascs same as in female (Fig. 11G). In adult male antennule much shorter than in female (Fig. 11K), with 10 terminal and 2 lateral aesthetascs as long as terminal ones. Male seta arising at 1/3 length from tip, about 1/3 of antennule length.

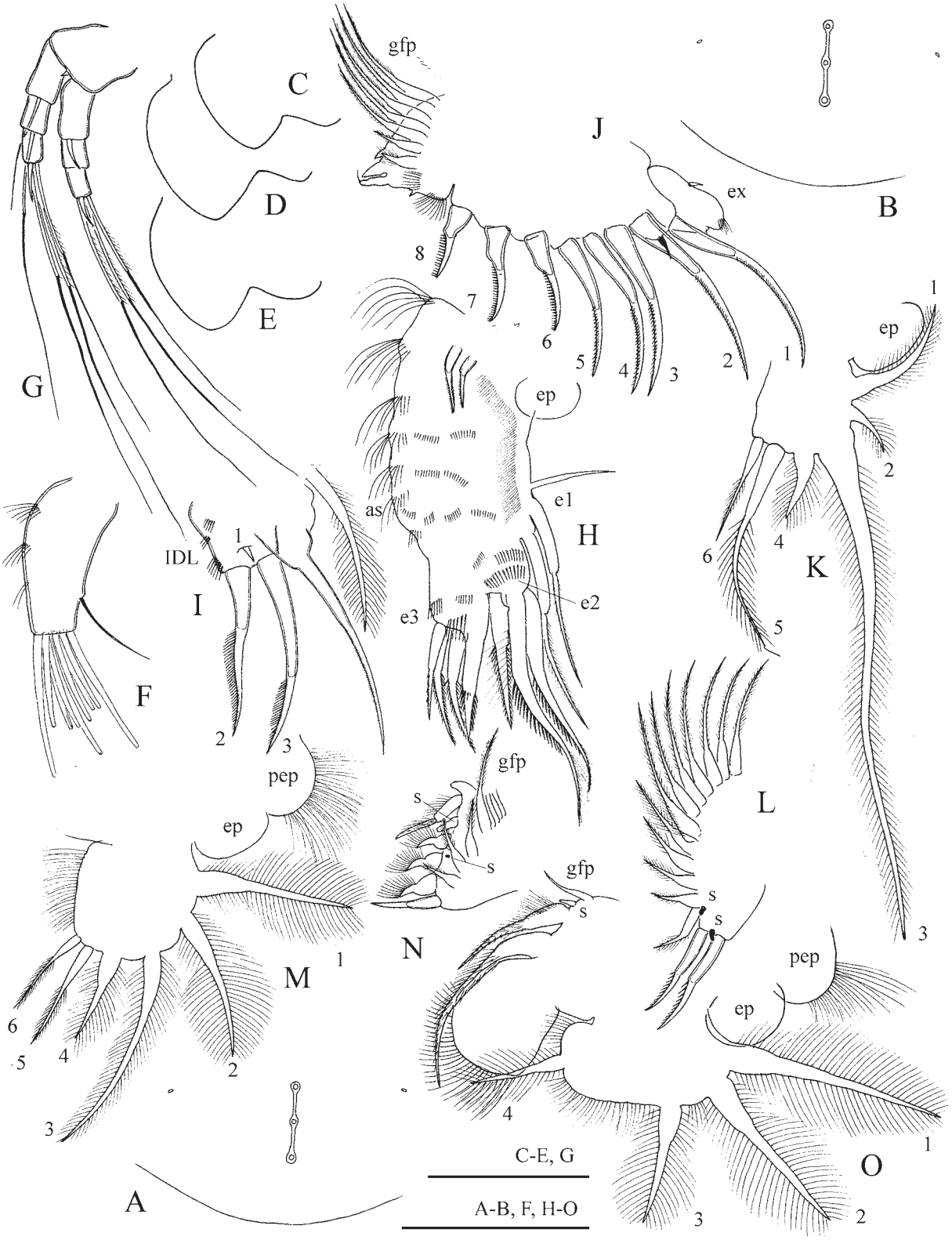

FIGURE 10. *Alona salina* Alonso, 1996, Laguna de la Dehesilla, parthenogenetic female. A–B—head pores. C-E—labrum. F—antennula. G—antenna. H–I—limb I and its ODL and IDL. J—limb II. K–L—exopodite and inner portion of limb III. M–N—exopodite and inner portion of limb IV. O—limb V. Scale bars: 0.1 mm for C–E, G; 0.05 mm for A–B, F, H–O.

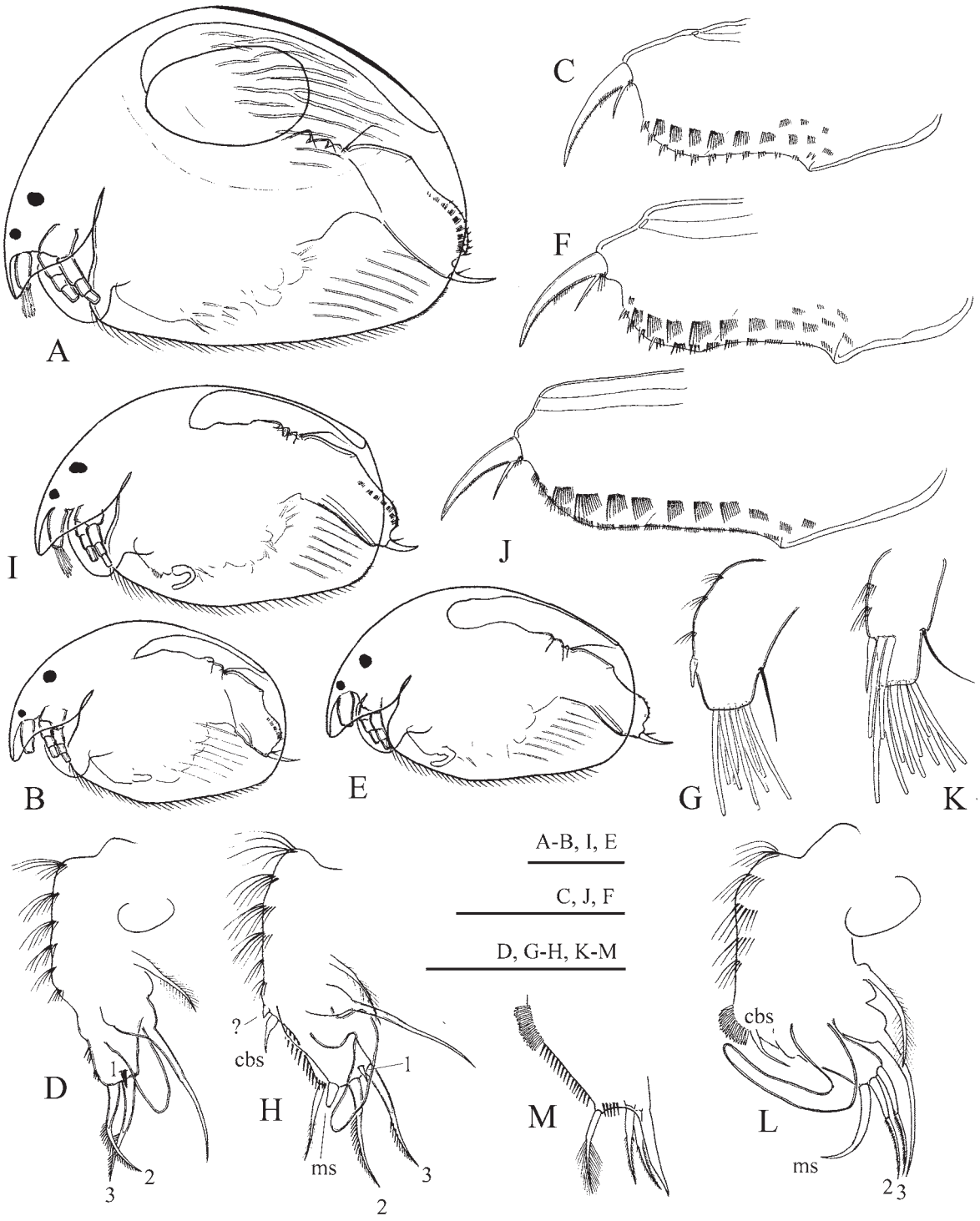

FIGURE 11. *Alona salina* Alonso, 1996, Laguna de la Dehesilla, gamogenetic individuals. A—ephippial female. B–D—juvenile male of instar I: B—lateral view, C—postabdomen, D—inner portion of limb I. E–H—juvenile male of instar II: E—lateral view, F—postabdomen, G—antennula, H—inner portion of limb I. I–M—adult male II: I—lateral view, J—postabdomen, K—antennula, L–M—inner portion and endite 3 of limb I. Scale bars: 0.1 mm for A–B, E, I; 0.05 mm for and C–D, F–H, J–M.

Thoracic limb I. In instar I male with short anlage of copulatory hook, IDL same as in female (Fig. 11D). In instar II male, copulatory hook curved (Fig. 11H). Ventral face of limb with anlage of copulatory brush seta and a peculiar hillock above it, not present in any other instar. IDL with anlage of male seta, other setae same

as in female. In adult male, limb I more stout than that of female (Fig. 10L), with U-shaped copulatory hook. Copulatory brush present. Row of about 15 short setules on ventral face of limb under copulatory brush (Fig. 11M). IDL seta 1 absent, setae 2 and 3 setae subequal in length, much thinner than in female, male seta thick, curved, as long as seta 2.

Size. In the studied population, instar I juvenile females length 0.29–0.32 mm, height 0.19–0.20 mm; instar II, length 0.35–0.38 mm, height 0.23–0.24 mm; adult female, length 0.39–0.61 mm, height 0.27–0.34 mm; instar I juvenile males, length 0.29–0.30 mm, height about 0.19 mm; instar II, length 0.31–0.33 mm, height 0.19–0.22 mm; adult males length 0.36–0.39 mm, height 0.22–0.24 mm.

Our data on morphology of *Alona salina* fully agree with those in the previous reports (Alonso 1990, 1996) with one exception. Alonso (1996) mistakingly reported that the antenna of *A. salina* lack seta on the middle segment of exopodite. This seta is present. The morphology of ephippium of *A. salina* agrees with that reported by Vandekerkhove et al. (2004).

Distribution and ecology. *A. salina* is known from permanent and temporary subsaline and saline water bodies on the Iberian Peninsula. Alonso (1996) considers it an Iberian endemic, typical of the Spanish endorheic systems. According to Boronat *et al.* (2001), it occurs at the wide diapason of salinities ranging from 5.7 to more that 100 mg/l. In the Iberian Peninsula, *A salina* coexists with halo-tolerant cladocerans namely *Daphnia magna, Daphnia akinsoni* Baird, 1859, *Moina brachiata* and *Dunhevedia crassa* King, 1853, but also with true halophyle cladocerans such as *Moina salina* and *Daphnia mediterranea* Alonso, 1985 (Alonso 1998).

Discussion

Alona irinae **sp. nov.** and *A. floessneri* **sp. nov.** both differ from *A. salina* in a number of distinct characters, summarised in Table 1. The level of differences between the species is the same as observed within other species-groups of the genus *Alona* (see Sinev 1999ab, 2001; Sinev & Hollwedel 2002, Van Damme & Dumont 2008a). These two species are also, in many characters, similar to two other species of the genus, the European *A. elegans* and Iberian *A. orellanai*. *A. elegans* (see Alonso 1996; Flössner 2000) clearly differs from the both new species in the shape of the postabdomen (anal portion of dorsal margin 1.5 times greater than preanal) and morphology of exopodite III (seta 4 almost as long as seta 5). *A. orellanai* (see Alonso 1996) is unique in the genus in having two rows of lateral fascicles of setules on the postabdomen .

The males of *A. irinae* **sp. nov.** and *A. floessneri* **sp. nov.** are quite similar to that of *A. salina* (see above), *A. elegans* and *A. orellanai* (see Alonso 1996) in most characters. They are characterised by having an antenna with two lateral aesthetascs, limb I with absent IDL seta 1 and well-developed male seta, and shortened postabdominal claw. The differences in the shape of male postabdomen are prominent, but these are also common within the species-groups (see Sinev 1998, 1999a).

Comparison of our results with data on morphology of *A. elegans* and *A. orellanai* shows that these species are also closely related to *A. salina.* Morphology of trunk limbs of *A. elegans* was completely studied and illustrated by Alonso (1996) and according to his data, the limbs of *A. orellanai* do not differ from those of *A. elegans* in any significant details. Four discussed species form a distinctive group of species within the *Alona*-like animals (*elegans*-group according to Van Damme & Dumont 2008b), characterized by a group of rare and unique characters. They include:

(1) Very small, practically rudimentary IDL seta 1. The majority of the *Alona*-like species have well-developed IDL seta 1, and even in members with small seta, such as species of *costata*-group (Sinev 1999), its length is greater than that in the species of *elegans*-group.

(2) Very small seta on exopodite II, with length about 0.1 length of exopodite itself. In other *Alona*-like animals, the length of this seta varies from 0.25–1.10 length of exopodite.

(3) Presence of a small soft seta near the base of scraper 1. Such a seta is present in some other genera of Aloninae, like *Acroperus* Baird, 1843 and *Karualona* Dumont & Silva-Briano, 2000, but not recorded in most

Alona species. This seta was found in three blind cave-dwelling species, *A. hercegovinae* Brancelj, 1990, *A. stochi* Brancelj, 1992 and *A. sketi* Brancelj, 1998; the position of this group within the genus is questioned (Sinev *et al.* 2005a).

(4) Gnathobase filter plate of limb V consisting of a single seta. In most other species, the gnathobase filter plate either consist of three setae of same size or absent; among *Alona*-like animals, a single seta is present in *Ovalona meridionalis* (Sinev, 2006), and in some species of *Coronatella* Dybowski & Grochowski, 1894 (see Van Damme & Dumont 2008b).

(5) Long, well-developed seta of the basal segment of the antennal endopodite. In most species of *Alona* sensu lato this seta is short, not reaching the end of endopodite.

(6) Male antenna with a pair of lateral aesthetascs. Most species of *Alona* sensu lato have only terminal aestetascs.

Species of *salina*-group also have numerous other common features — same morphology of head shield, head pores, antenna and antennule; similar shape and armament of postabdomen; filter plate II with two setae shorter than others; limb III with six setae; well-developed sculpture of valves; posteroventral angle armed with numerous thin setules; absence of limb VI. Uniformity in such characters is observed within the other species-groups of *Alona* sensu lato, and confirms close relationship between the species of *salina*-group.

At present moment, *Alona* sensu lato is a huge artificial assemblage of species, many of which share only general similarity to each other. It presently contains at least seven groups of potential generic rank, and many species of unclear affinities (Sinev et al. 2005a). The genus is being actively revised, and several new genera were established (Dumont & Silva-Briano 2000; Sinev 2004; Sinev & Shiel 2008; Van Damme & Dumont 2009; Van Damme *et al.* 2009); some species were transferred to other genera (Van Damme *et al.* 2003; Sinev *et al*. 2005b). Recent revisions of *Alona* sensu lato by Van Damme & Dumont (2008a, b) show that the amorphous group of *Alona*-like animals can be split into two main branches. The *Hexalona*-branch is characterised by well-developed IDL seta 1, exopodite III with seven setae, and, frequently, presence of thoracic limb VI and filter plate of limb V. The *Coronatella*-branch consists of more advanced animals and is characterised by numerous reductions — rudimentary IDL seta 1, exopodite III with six setae, absence of limb IV and filter plate of limb V. Each branch includes several large groups of species, most defined in the works of Sinev (1998, 1999a, b, 2001, 2008, 2009 and others), all of them of potential generic rank, though with most of them not yet formally named. The only exception is recently re-established *Coronatella*, which includes species of the former *rectangula*-group. According to Van Damme & Dumont (2008a), *Alona* sensu stricto is a very small group presently consisting of three species, including *A. quadrangularis* (the type species of the genus), characterized by numerous peculiarities in the limb morphology. Numerous species of unclear affinity are present in both branches of *Alona* sensu lato, their presence adds to confusion (Sinev *et al.* 2005a). The present state of *Alona* taxonomy is far from acceptable, and future revisions are urgently needed. The *elegans*-group doubtless belongs to *Coronatella*-branch of *Alona* sensu lato. It shares the main features of the group — exopodite III with only six setae and strongly reduced IDL seta 1, only one seta in filter plate V, and absence of limb VI. In comparison with other members of the *Coronatella*-branch, *verrucosa*-group, *Karualona*, etc, the *elegans*-group had fewer reductions and no specialised setae on limbs. This suggests the early separation of the *elegans*-group from the main trend of *Coronatella*-like animals.

Unlike the majority of the species-groups within *Alona* sensu lato, the group is mostly confined to the specific habitats — small and temporary freshwater bodies or saline waters. Only one species of the *salina*-group, *A. elegans*, is distributed over a very large area, inhabiting Central and South Europe and North Africa. *A. salina* and *A. orellanai* confined to the Iberian Peninsula. *A. irinae* **sp. nov.** and *A. floessneri* **sp. nov.** are also unlikely to have wide area of distribution. These facts, as pointed out by Korovchinsky (2006) also point to the ancient, relict nature of the group. In contrast, other well-defined species-group of *Alona* sensu lato (*quadrangularis, pulchella, affinis, costata, guttata*), as well as *Coronatella* sensu stricto (the former *rectangula*-group), are distributed practically world-wide (Sinev 2008) or at least pantropically (like *Karualona*, *verrucosa*-group) and inhabit a wide range of water bodies, being most common in permanent lakes and slow rivers.

Our data confirm the generic status of the *elegans*-group, but a revision of *Alona elegans* (including North African subspecies *A. elegans lebes* Dumont & Van de Velde, 1975) and *A. orellanai* is required for the formal recognition of a new genus. The position of the *elegans*-group within Aloninae was already discussed by Van Damme & Dumont (2008b), who noticed that this genus appears to occupy an intermediate position between *Ovalona* and *Coronatella,* though its exact taxonomic position remains unclear. Species of *elegans*-group less advanced traits in limb morphology (specialized limbs setae, reduced limb setae, etc.) than other taxa of *Coronatella*-branch, and this suggest an ancestral position of the group within the branch, which agrees well with the group relict nature.

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